US007828756B2

(12) **United States Patent**
**Kamba et al.**

(10) **Patent No.: US 7,828,756 B2**
(45) **Date of Patent: Nov. 9, 2010**

(54) **MASSAGE MACHINE OF CHAIR TYPE**

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( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 262 days.

(21) Appl. No.: **11/881,898**

(22) Filed: **Jul. 30, 2007**

(65) **Prior Publication Data**

US 2008/0030053 A1 Feb. 7, 2008

(30) **Foreign Application Priority Data**

Aug. 1, 2006 (JP) ..... 2006-209539

(51) **Int. Cl.**
***A61H 7/00*** (2006.01)

(52) **U.S. Cl.** ..... **601/98**; 297/217.3; 297/85 M; 297/68

(58) **Field of Classification Search** ..... 297/217.1, 297/217.3, 411.42, 85 M, 68; 601/98, 49, 601/149, 151; 4/517, 519, 523
See application file for complete search history.

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(57) **ABSTRACT**

A chair-type massage machine is provided which comprises a seat, backrest and leg portion having a plurality of preset reclining angles for giving an effective massage to the user in various postures. The massage machine comprises a seat pivotally movably supported by a base, a backrest pivotally movably supported by the seat at the rear end thereof, a leg portion pivotally movably supported by the seat at the front end thereof, control means for controlling seat moving means, backrest moving means and the leg portion moving means and a manual controller. The control means has stored therein a plurality of preset reclining angles with respect to the angle of the seat, backrest and the leg portion. The manual controller has reclining selection buttons for selecting one of the reclining angles and an initial position button. The control means operates the moving means for the seat, backrest and leg portion when the reclining angle is selected by the reclining selection button and pivotally moves the seat, backrest and leg portion to the selected angle.

**11 Claims, 11 Drawing Sheets**

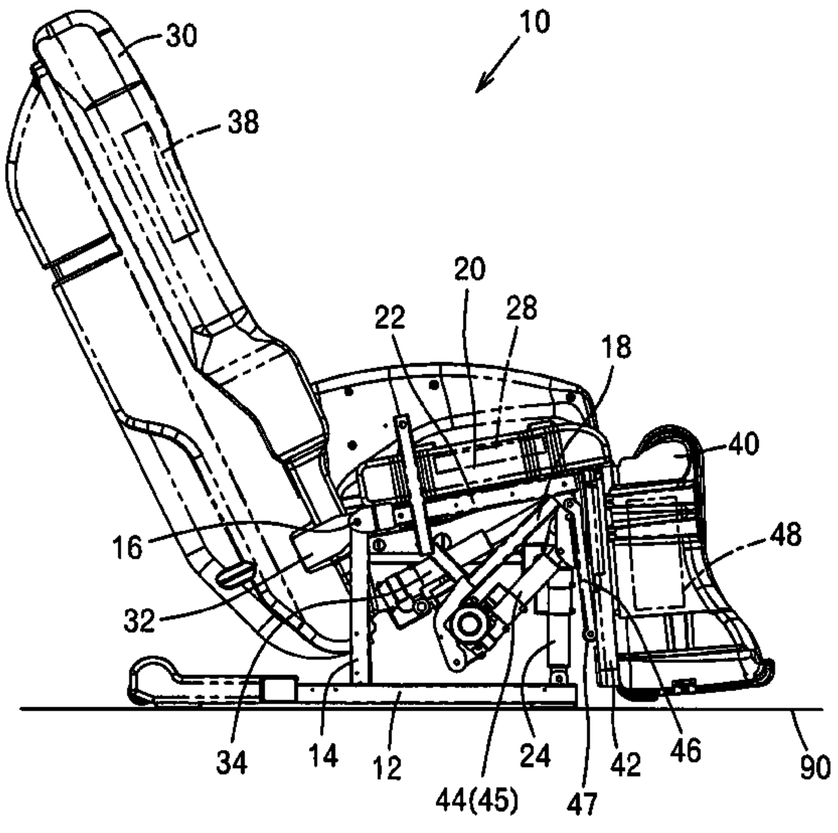

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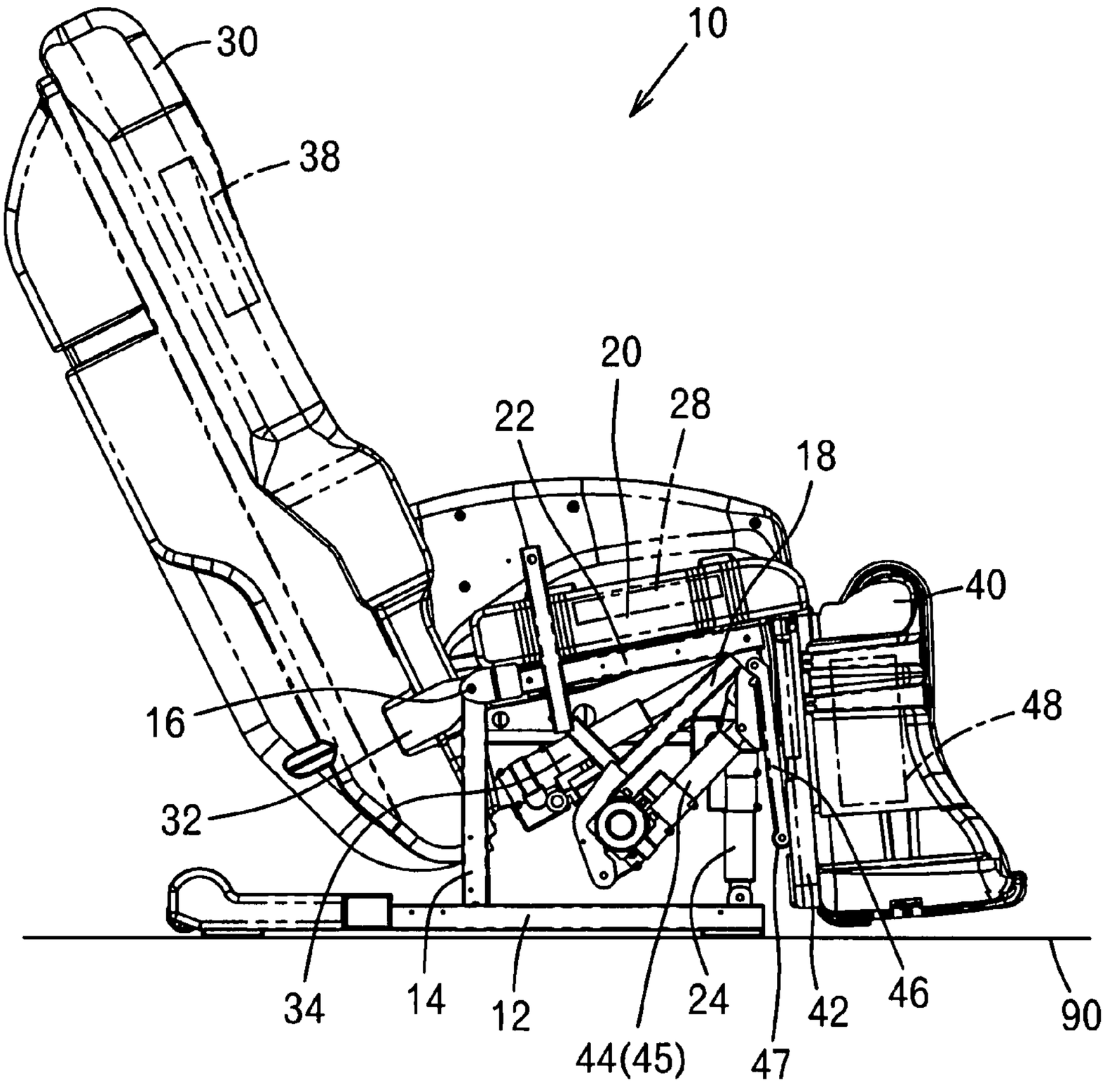
FIG. 1



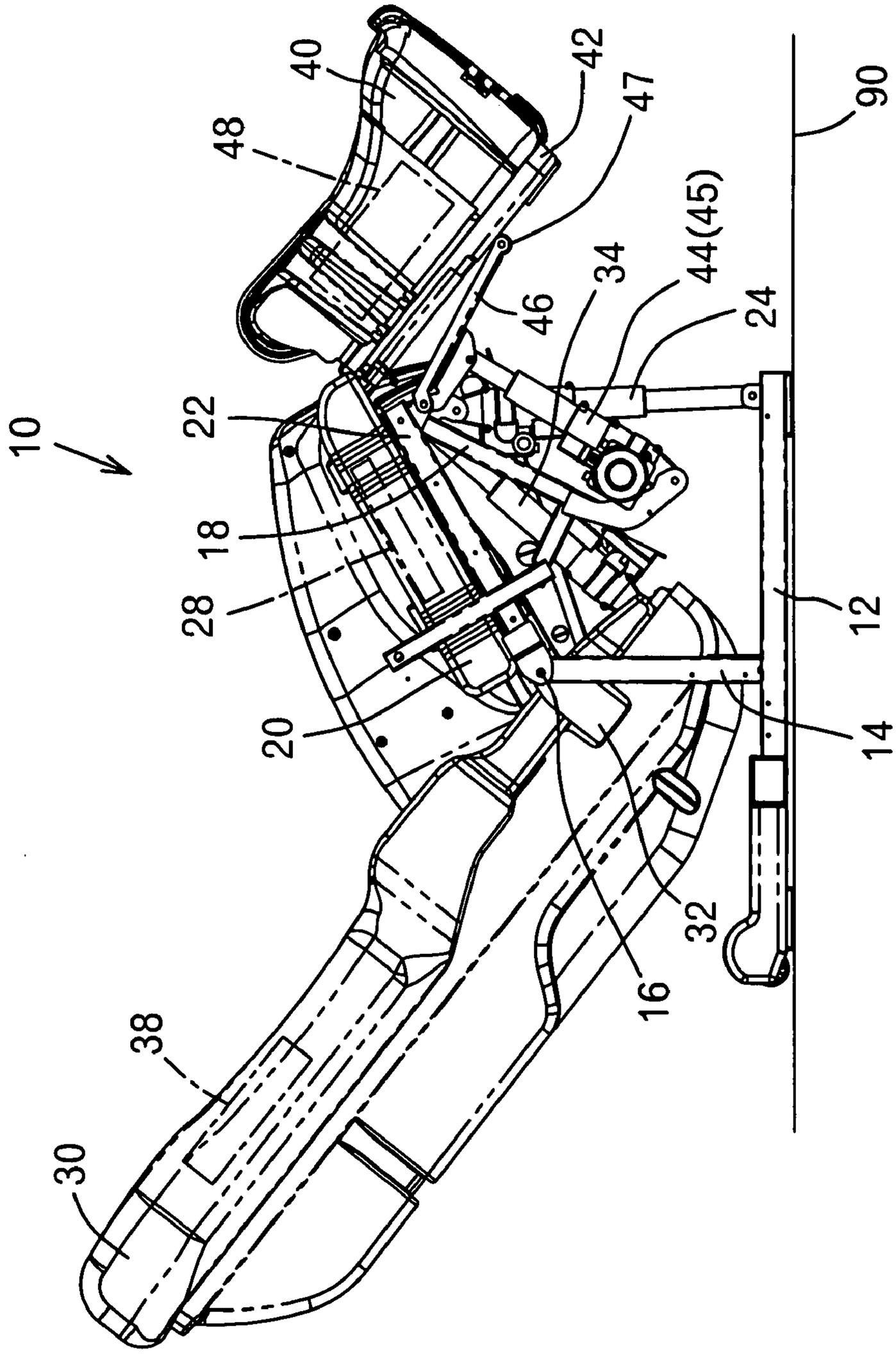



FIG. 2

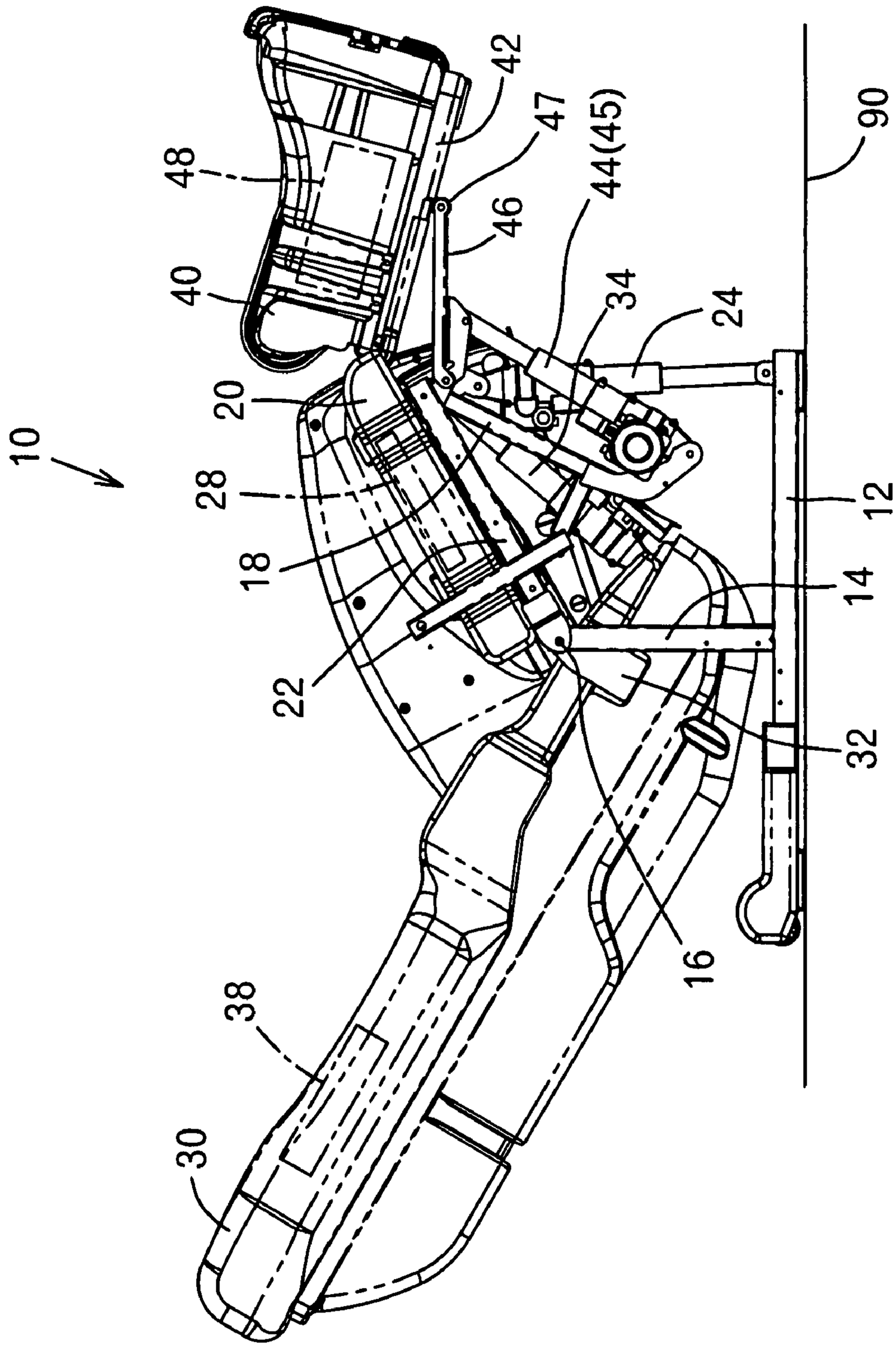



FIG. 3

FIG. 4

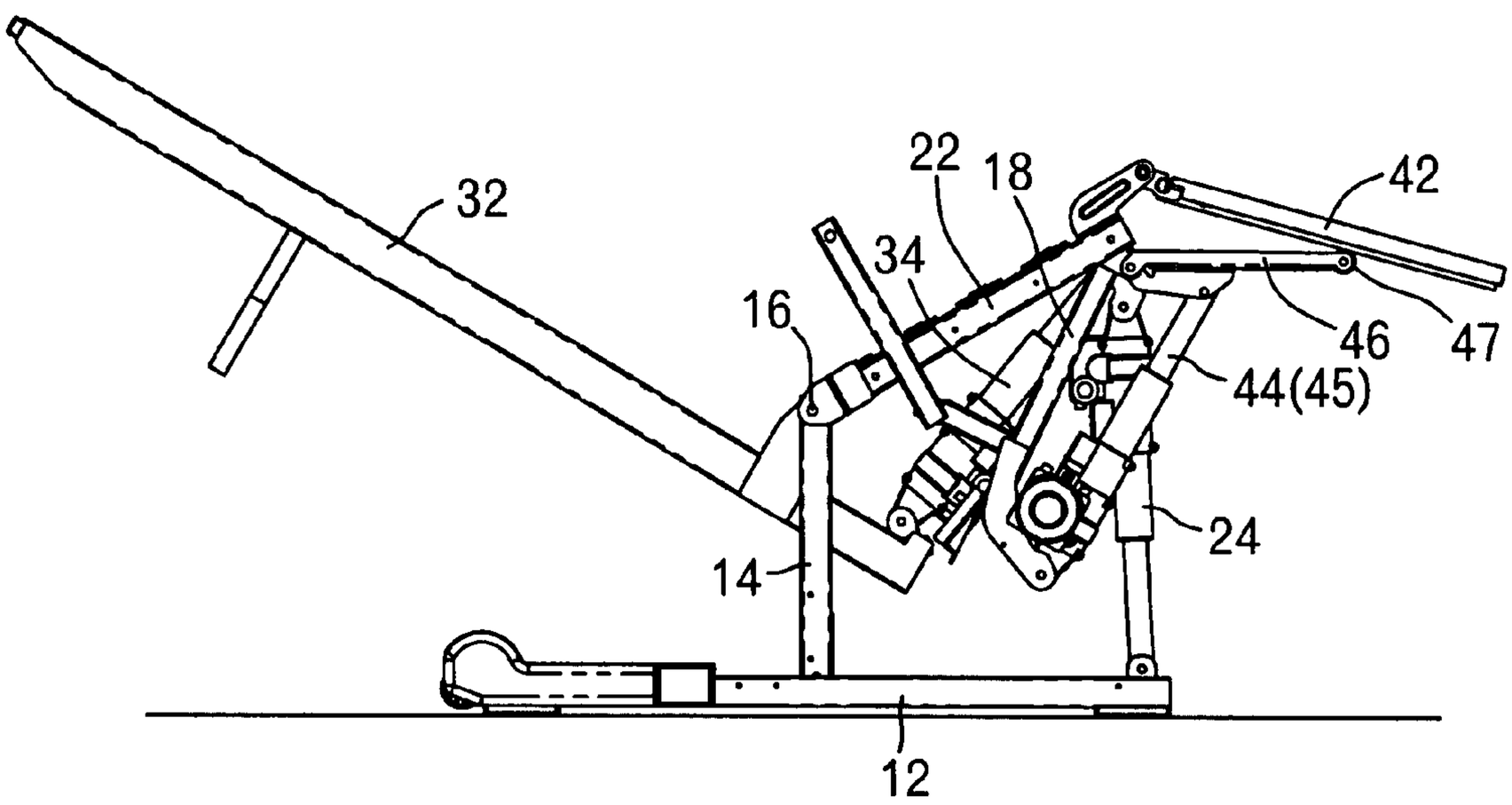
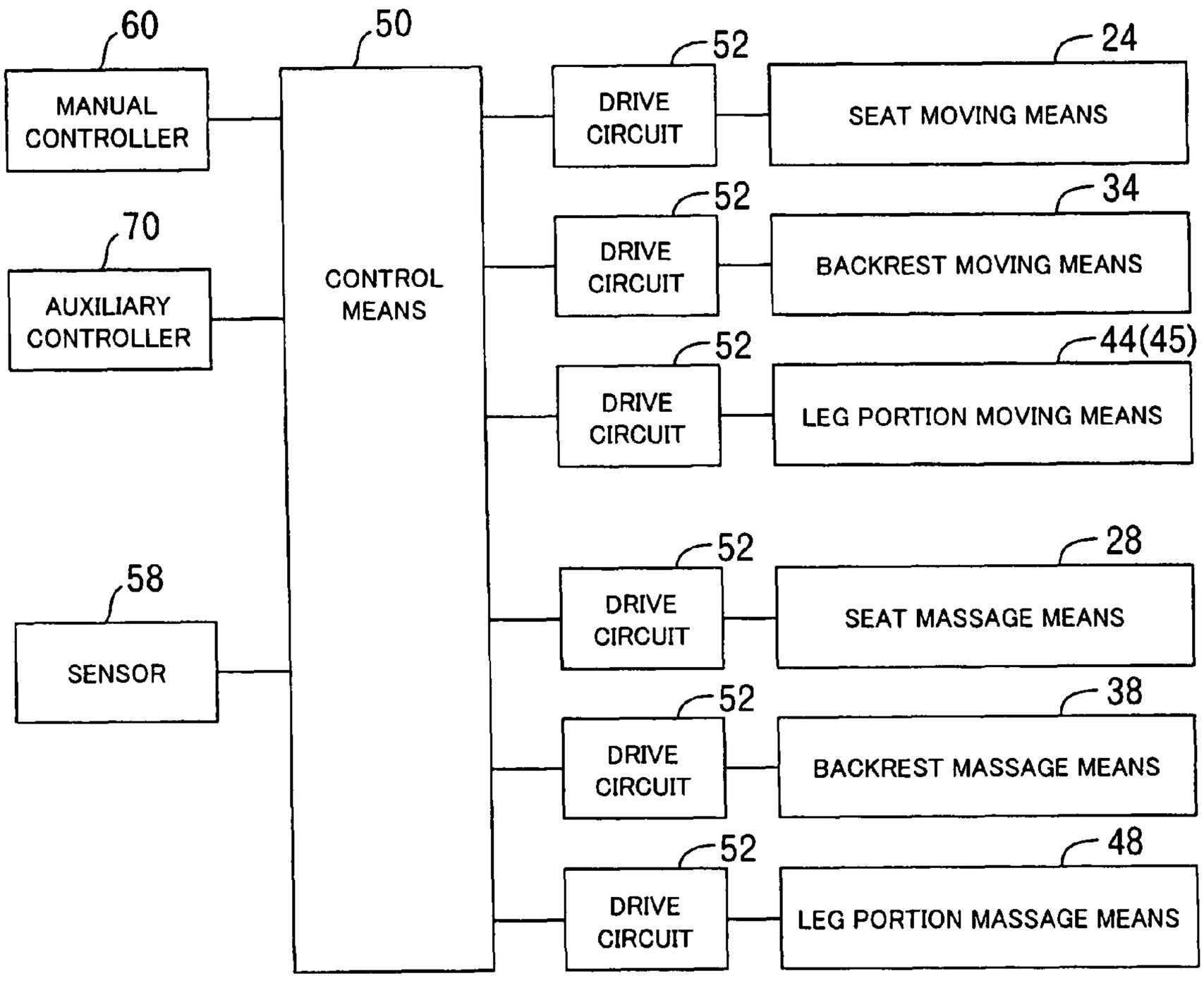


FIG. 5


60
MANUAL CONTROLLER
70
AUXILIARY CONTROLLER
58
SENSOR
50
CONTROL MEANS
52
DRIVE CIRCUIT
24
SEAT MOVING MEANS
52
DRIVE CIRCUIT
34
BACKREST MOVING MEANS
52
DRIVE CIRCUIT
44(45)
LEG PORTION MOVING MEANS
52
DRIVE CIRCUIT
28
SEAT MASSAGE MEANS
52
DRIVE CIRCUIT
38
BACKREST MASSAGE MEANS
52
DRIVE CIRCUIT
48
LEG PORTION MASSAGE MEANS

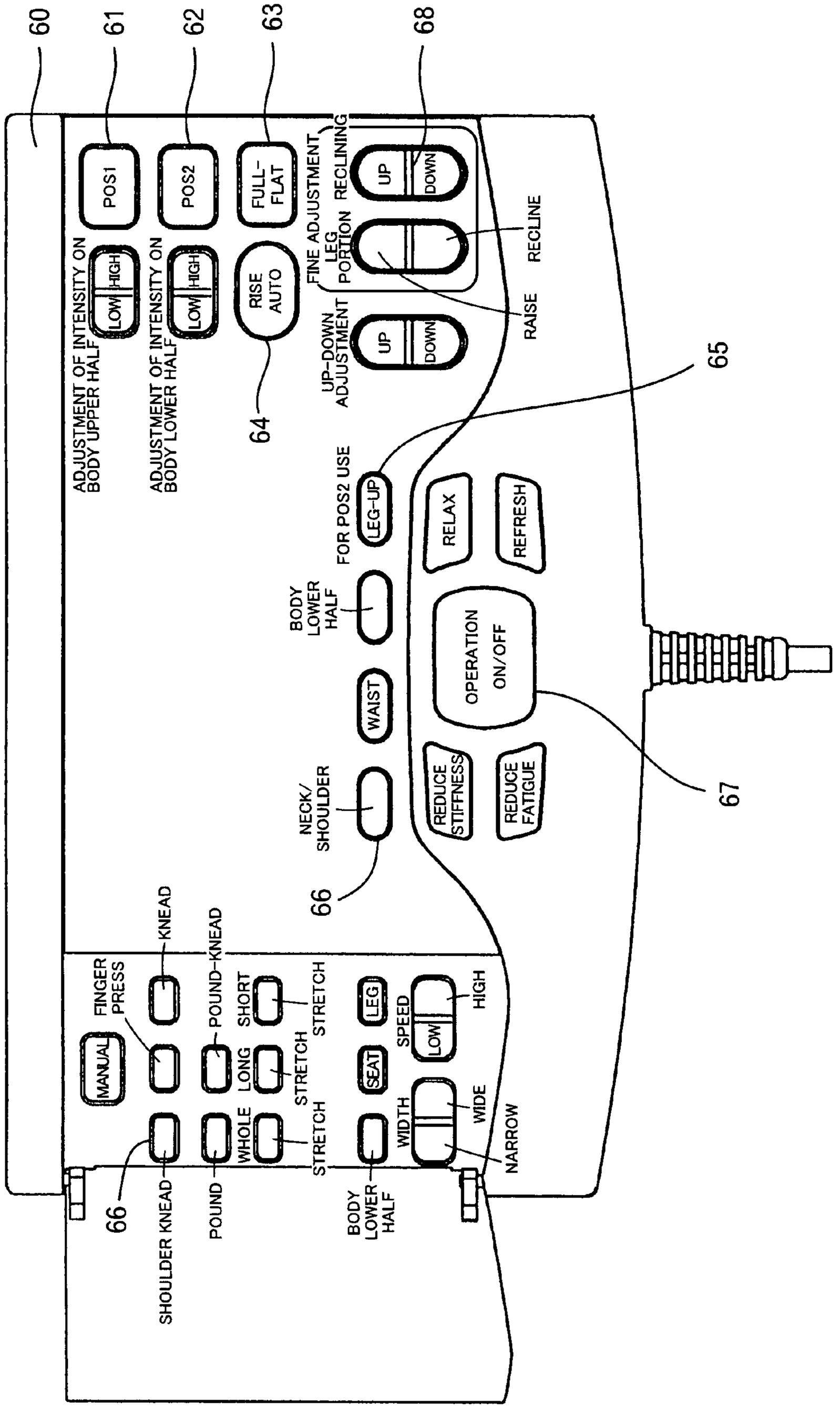

60
61
62
63
68
65
64
66
67
POS1
POS2
FULL-FLAT
RISE AUTO
FINE ADJUSTMENT OF RECLINING LEG PORTION
UP
DOWN
RECLINE
RAISE
UP-DOWN ADJUSTMENT
ADJUSTMENT OF INTENSITY ON BODY UPPER HALF
ADJUSTMENT OF INTENSITY ON BODY LOWER HALF
LOW
HIGH
FOR POS2 USE
LEG-UP
BODY LOWER HALF
NECK/ SHOULDER
WAIST
RELAX
REFRESH
OPERATION ON/OFF
REDUCE STIFFNESS
REDUCE FATIGUE
KNEAD
POUND-KNEAD
FINGER PRESS
SHORT STRETCH
LONG STRETCH
WHOLE STRETCH
MANUAL
SEAT
LEG
SPEED
LOW
HIGH
WIDTH
WIDE
NARROW
SHOULDER KNEAD
POUND
BODY LOWER HALF

FIG. 6

FIG. 7

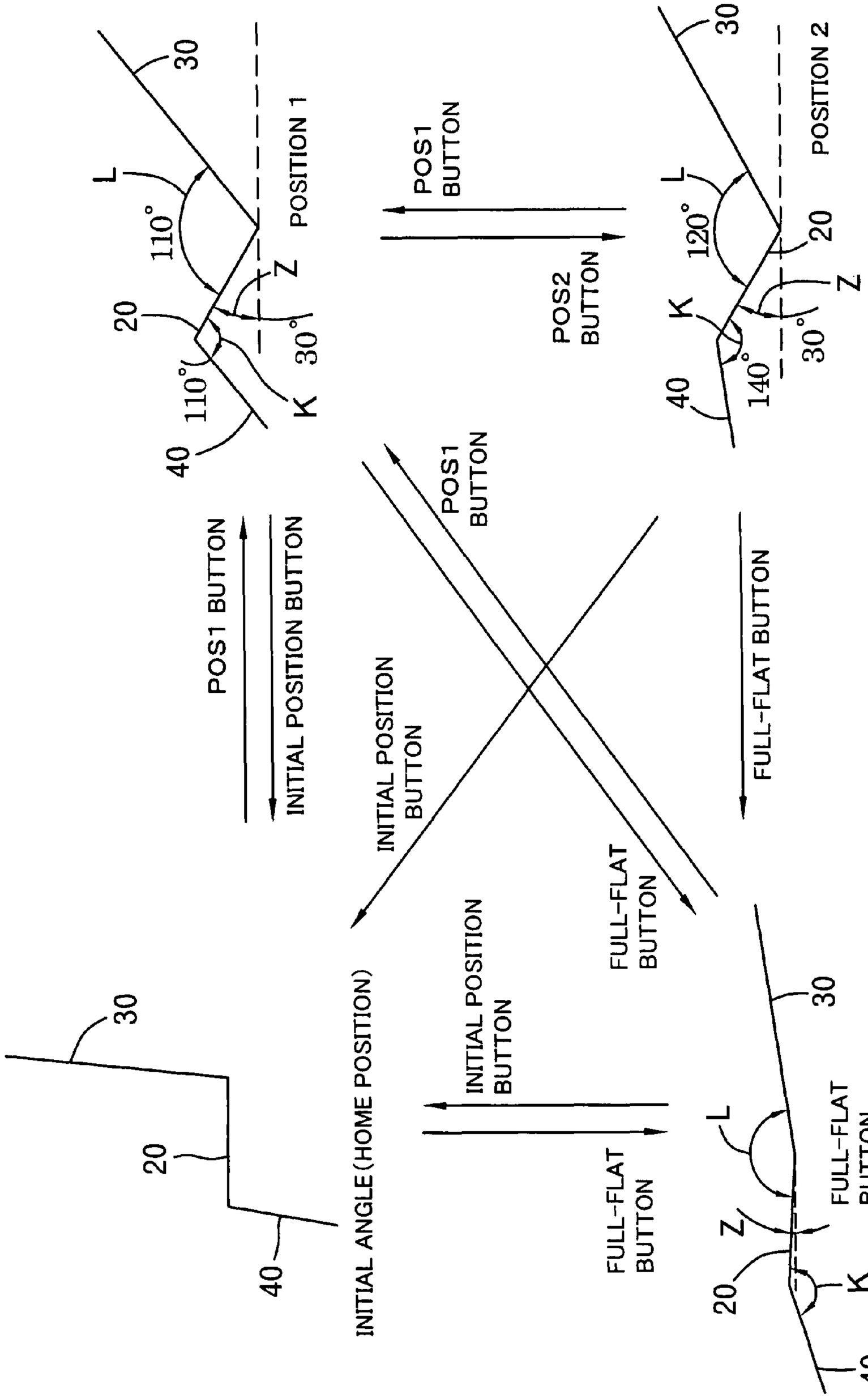

30
L
110°
20
Z
POSITION 1
110°
30°
K
40
POS1 BUTTON
INITIAL POSITION BUTTON
INITIAL ANGLE (HOME POSITION)
30
20
40
POS1 BUTTON
POS2 BUTTON
INITIAL POSITION BUTTON
FULL-FLAT BUTTON
30
L
120°
20
K
Z
140°
30°
40
POSITION 2
POS1 BUTTON
INITIAL POSITION BUTTON
FULL-FLAT BUTTON
30
L
Z
20
K
40
FULL-FLAT BUTTON

FIG. 8

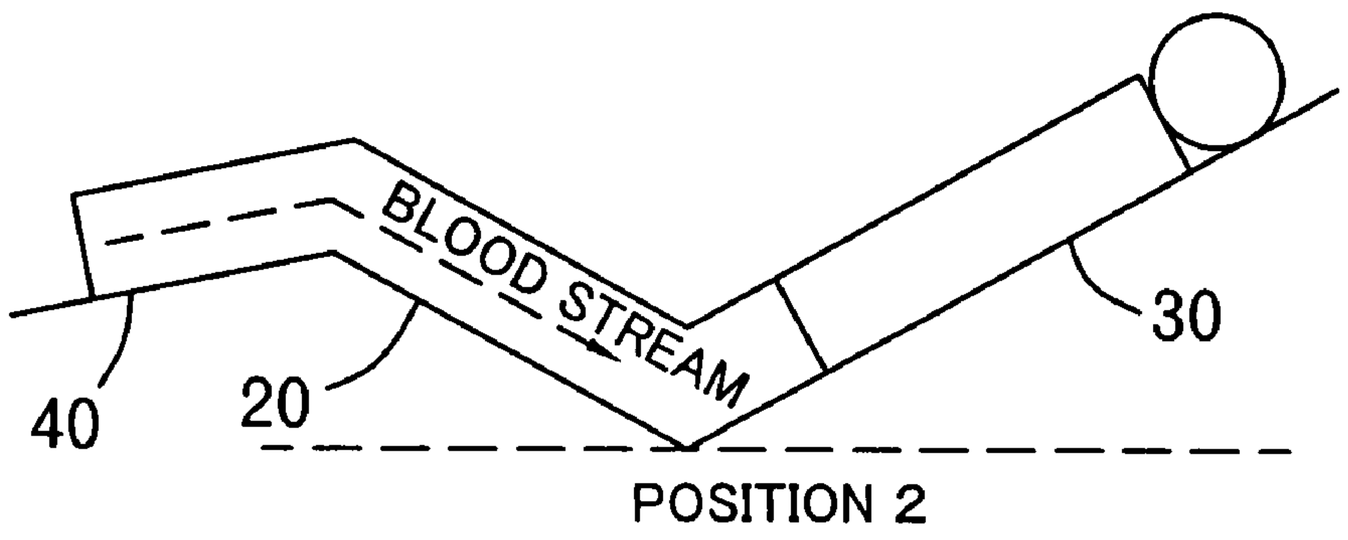



FIG. 9

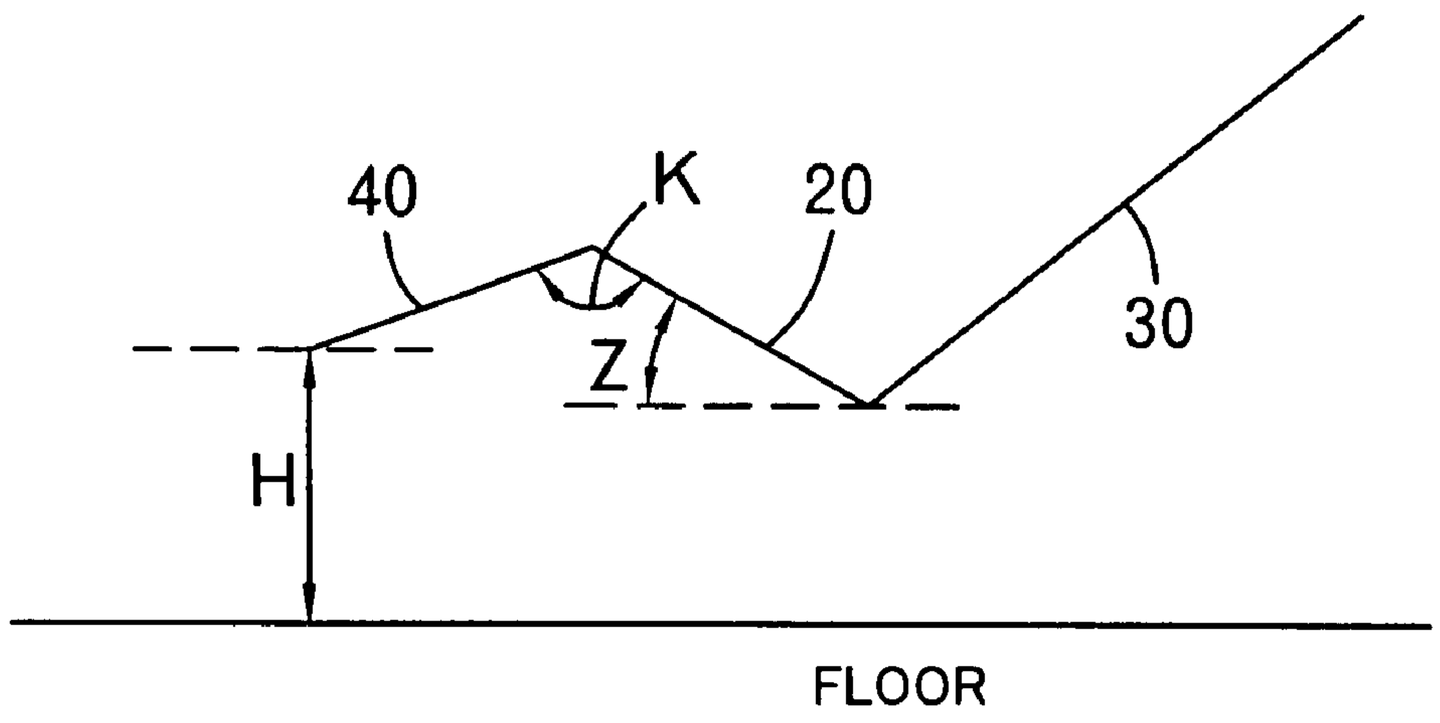


FIG. 10

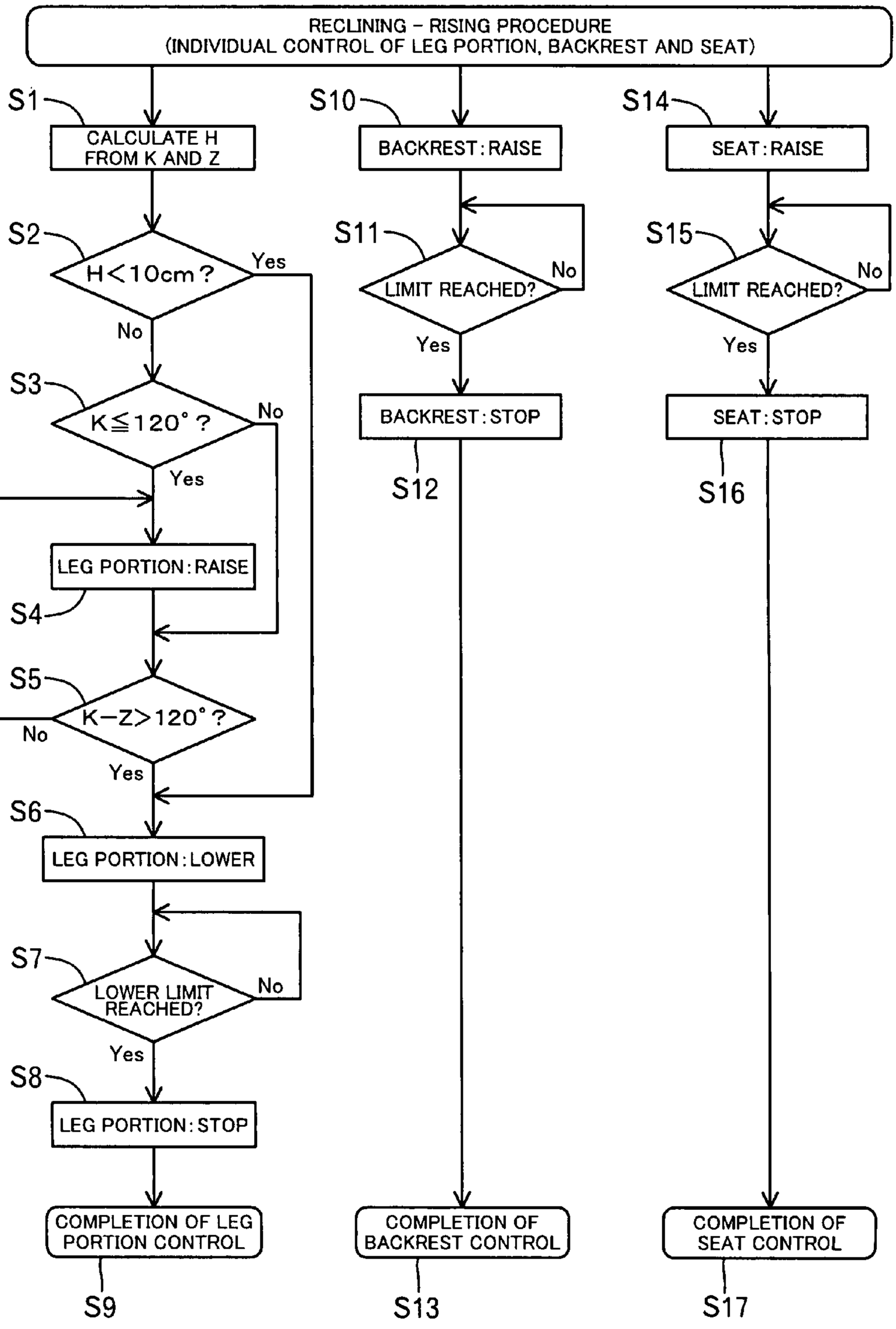

RECLINING - RISING PROCEDURE
(INDIVIDUAL CONTROL OF LEG PORTION, BACKREST AND SEAT)
S1
CALCULATE H FROM K AND Z
S2
H<10cm?
Yes
No
S3
K≦120°?
No
Yes
LEG PORTION: RAISE
S4
S5
K-Z>120°?
No
Yes
S6
LEG PORTION: LOWER
S7
LOWER LIMIT REACHED?
No
Yes
S8
LEG PORTION: STOP
COMPLETION OF LEG PORTION CONTROL
S9
S10
BACKREST: RAISE
S11
LIMIT REACHED?
No
Yes
BACKREST: STOP
S12
COMPLETION OF BACKREST CONTROL
S13
S14
SEAT: RAISE
S15
LIMIT REACHED?
No
Yes
SEAT: STOP
S16
COMPLETION OF SEAT CONTROL
S17

FIG. 11

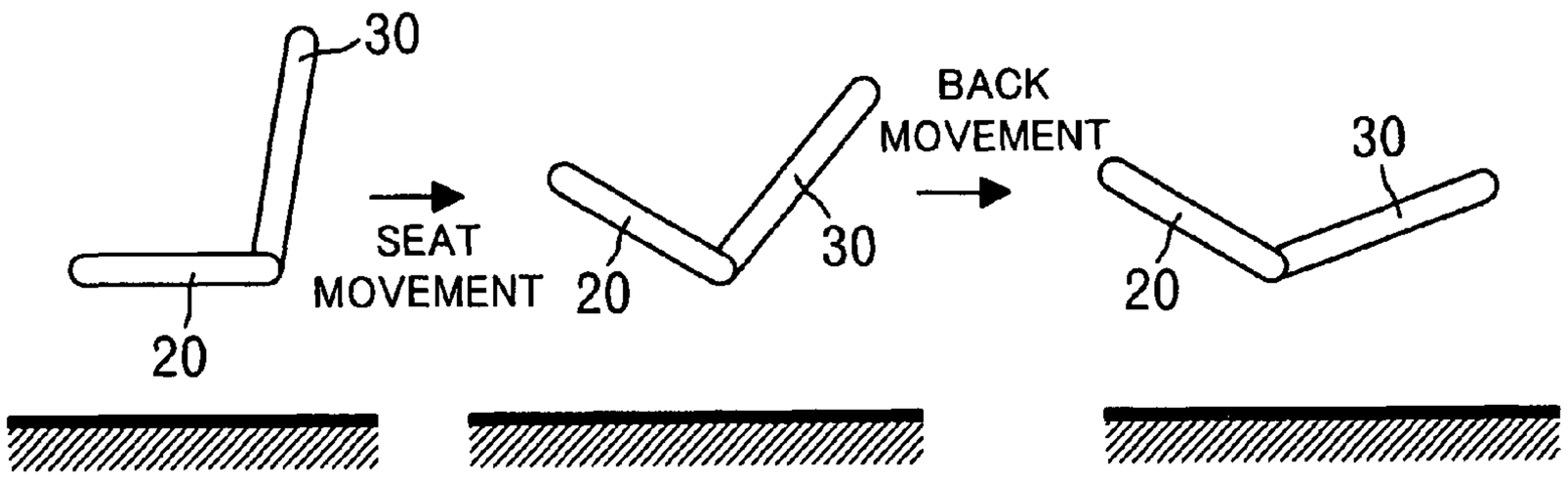

30
20
SEAT
MOVEMENT
20
30
BACK
MOVEMENT
30
20

FIG. 12

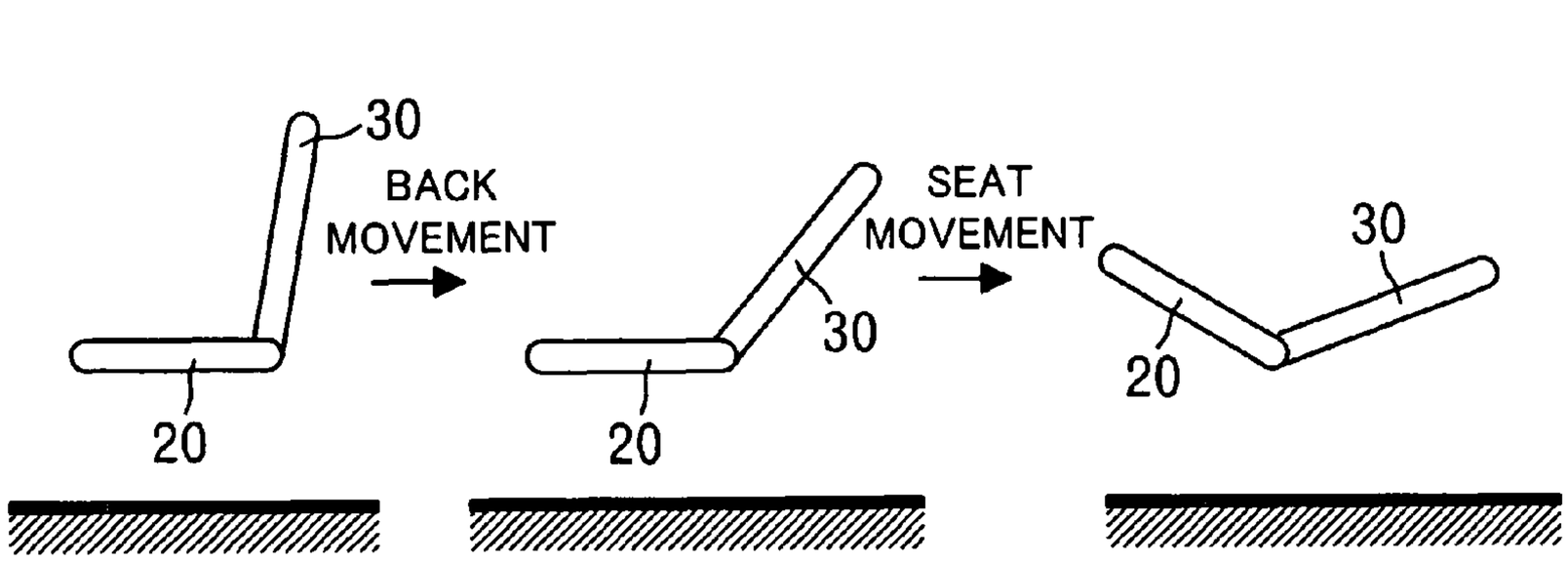
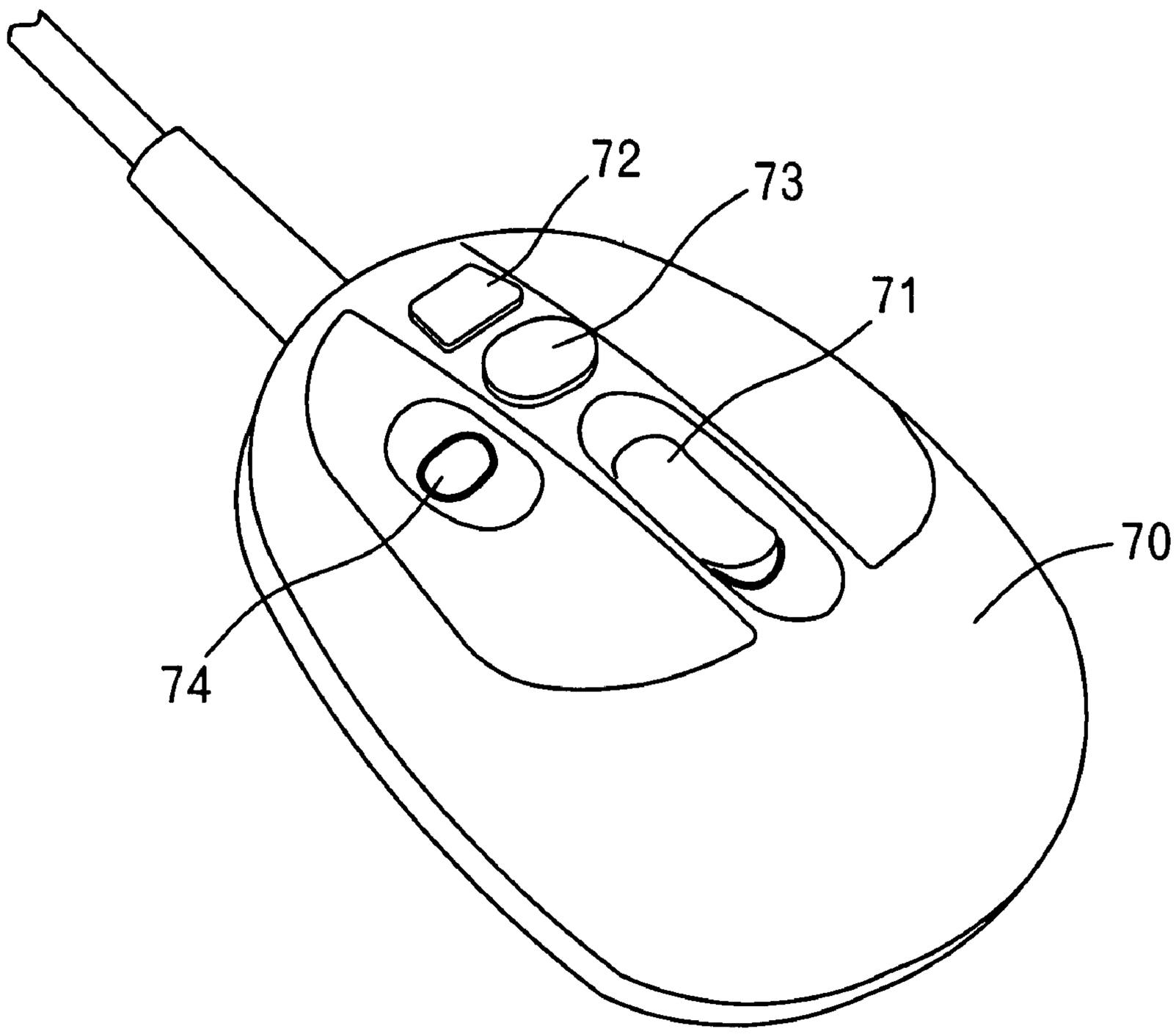

30
20
BACK
MOVEMENT
20
30
SEAT
MOVEMENT
30
20

FIG. 13



# MASSAGE MACHINE OF CHAIR TYPE

## TECHNICAL FIELD

The present invention relates to massage machines of the chair type comprising a seat, backrest and leg portion which are pivotally movable.

## BACKGROUND ART

Chair-type massage machines comprise a seat, backrest and leg portion which are each pivotally movable. The seat, backrest and leg portion each have incorporated therein massage means for massaging the affected part of the user to be treated.

The massage machine has moving means adapted to pivotally moving the seat, backrest and leg portion, respectively. The machine has a manual control unit, which is manipulated by the user for pivotally moving the seat, backrest and leg portion to a desired angle, or automatically pivotally moving the seat, backrest and leg portion to a preset reclining angle (see, for example, JP2004-344316A).

However, the preset reclining angle is solely one value. No massage machines are available which are adapted to present a plurality of reclining angles, nor are there any massage machines which have a plurality of preset reclining angles enabling the user to feel apparently different when seated in the seat as set at the different angles.

An object of the present invention is to provide a massage machine of the chair type comprising a seat, backrest and leg portion having a plurality of preset reclining angles for giving an effective massage to the user in various postures.

## SUMMARY OF THE INVENTION

To fulfill the above object, the present invention provides a massage machine of the chair type which comprises a base to be placed on a floor, a seat pivotally movably supported by the base for the user to be seated in, a backrest pivotally movably supported by the seat at a rear end thereof for the user's back to bear on, a leg portion pivotally movably supported by the seat at a front end thereof for the user's calves to bear on, seat moving means for pivotally moving the seat, backrest moving means for pivotally moving the backrest, leg portion moving means for pivotally moving the leg portion, control means for controlling the seat moving means, the backrest moving means and the leg portion moving means, a manual controller electrically connected to the control means for manipulating the seat moving means, the backrest moving means and the leg portion moving means,

the control means having stored therein a plurality of preset reclining angles with respect to the angle of the seat, backrest and the leg portion,

the manual controller having reclining selection buttons for selecting desired one of the plurality of reclining angles,

the control means being operable to operate the seat moving means, the backrest moving means and the leg portion moving means when the reclining angle is selected by the reclining selection button and pivotally move the seat, the backrest and the leg portion to the selected reclining angle.

The chair-type massage machine of the invention has a plurality of preset reclining angles for the seat, the backrest and the leg portion, and the seat, backrest and leg portion can be pivotally moved to the desired reclining angle by the manipulation of the user for the user to receive a massage on the affected part in an optimum posture to achieve an enhanced massage effect.



## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevation of a chair-type massage machine (in a home position) of the invention;

FIG. **2** is a side elevation of the chair-type massage machine (in position **1**) of the invention;

FIG. **3** is a side elevation of the chair-type massage machine (in position **2**) of the invention;

FIG. **4** is a view showing only frames and the like serving as main components of the massage machine of FIG. **3**;

FIG. **5** is a block diagram of control means;

FIG. **6** is a plan view of a manual controller;

FIG. **7** is a diagram showing changes in the state of a seat, backrest and leg portion of the chair-type massage machine of the invention:

FIG. **8** is a diagram showing the posture of the user in position **2**;

FIG. **9** is a diagram for illustrating the angle Z of the seat with respect to the floor, the angle K of the leg portion with respect to the seat, and the level H of the leg portion;

FIG. **10** is a flow chart showing an example of reclining control procedure of the chair-type massage machine of the invention;

FIG. **11** is a diagram showing the seat as pivotally moved earlier than the backrest;

FIG. **12** is a diagram showing the backrest as pivotally moved earlier than the seat; and

FIG. **13** is a perspective view of an auxiliary controller.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. **1** is a view showing a massage machine **10** of the chair type as it is seen from one side thereof. For a better understanding, the machine is shown with an armrest thereof closer to the viewer removed.

As illustrated, the chair-type massage machine **10** has a base **12** to be placed on a floor **90** and a seat **20** provided on the base **12** for the user to sit in. The seat **20** is provided with a backrest **30** at the rear end thereof and with a leg portion **40** at the front end thereof.

The seat **20** has a seat frame **22** provided with a cushion or the like and pivotably supported at its rear end by a base frame **14**. The seat frame **22** has a front end connected to seat moving means **24** comprising a motor or an actuator serving as drive means. The illustrated embodiment has a motor serving as the drive means. The seat **20** is pivotally movable relative to the base **12** by operating the seat moving means **24**.

An air bag or like massage means **28** is provided on the seat **20**.

The backrest **30** is pivotally movable relative to the seat **20** or the base **12** by backrest moving means **34** comprising a motor or actuator as drive means. The drive means of the illustrated embodiment is a motor.

According to the illustrated embodiment, a backrest frame **32** is pivoted to the base **12** by a pivot **16** which serves also for the seat frame **22** in common. The backrest moving means **34** has one end connected to the lower end of the backrest frame **32** and the other end connected to the front end of the seat frame **22**. Accordingly, when the seat **20** is pivotally moved, the backrest **30** pivotally moves with the seat **20**. To pivotally move the seat **20** only without pivotally moving the backrest **30**, it is therefore necessary to pivotally move the backrest **30** in a direction opposite to the direction of pivotal movement of the seat **20**.

It is also possible to pivotally movably support the backrest **30** on the base **12** and to connect the other end of the backrest

moving means **34** also to the base **12**. The backrest **30** is then pivotally movable independently of the seat **20**. The backrest **30** is pivotally movable with the seat **20** by pivotally moving the backrest **30** in the same direction as the direction of pivotal movement of the seat **20**.

The backrest **30** is provided with therapeutic fingers or like known massage means **38** upwardly or downwardly movably.

The leg portion **40** is supported directly by the forward end of the seat **20**. The leg portion **40** is provided with air bags or like massage means **48**.

Leg portion moving means **44** for pivotally moving the leg portion **40** may comprise a motor, actuator or like drive means which is provided on the seat **20**. Alternatively, the leg portion **40** may be pivoted to the seat **20**, and the drive means providing the leg portion moving means **44** may be provided on the base **12** to prevent the seat **20** from becoming heavier.

According to the illustrated embodiment, a motor serves as the drive means providing the leg portion moving means **44**. A frame **18** extending rearward from the bottom of the front end of the seat **20** has supported thereon an actuator **45** which is pivotally movable in a plane parallel to the front-to-rear direction. The actuator **45** has a forward end which is connected to a pushing-up frame **46** pivoted to the bottom of a front portion of the seat **20**. The pushing-up frame **46** carries at its forward end a roller **47**. The leg portion **40** has a frame **42** which is adapted to come into contact with the roller **47**.

When the actuator **45** providing the leg portion moving means **44** is operated in a stretching direction, the pushing-up frame **45** pivotally moves to a forwardly raised position to push the leg portion **40** forwardly upward. When the actuator **45** is operated toward a retracting direction, the pushing-up frame **46** retracts to move the leg portion **40** downward. The leg portion frame **42** is merely in bearing contact with the roller **47** under gravity, so that when an article or like obstacle is present in the path of movement of the leg portion **40**, the roller **47** moves out of contact with the leg portion frame **42**, obviating the likelihood that the leg portion **40** will retract further.

The moving means **24**, **34**, **44** and the massage means **28**, **38**, **48** are electrically connected by drive circuits **52**, **52**, **52** to control means **50** disposed at a suitable portion of the massage machine **10** to operate in response to commands from the control means **50**. The control means **50** comprises a CPU, control circuits, memories, etc. for the moving means **24**, **34**, **44** as seen in FIG. **5**.

FIG. **6** shows a manual controller **60** for manipulating the massage machine **10** variously. The manual controller **60** is electrically connected to the control means **50**, and has a plurality of buttons **61** to **68** for effecting various modes of control of the massage means **28**, **38**, **48** and suitably adjusting moving angles (reclining angles) of the seat **20**, backrest **30** and leg portion **40**. No description will be given of the method of manipulating the massage means **28**, **38**, **48** and the kinds of movements thereof.

The reclining selection buttons **61**, **62**, **63** on the manual controller **60** serve to operate the respective moving means **24**, **34**, **44** so as to pivotally move the seat **20**, backrest **30** and leg portion **40** to "preset reclining angles" stored in the memory of the control means **50** for the respective buttons.

The manual button **64** is an initial position button for restoring the reclining angle to a preset "initial angle (home position)."

At the touch of the reclining selection button **61**, **62** or **63** or the initial position button **64**, the control means **50** operates the moving means **24**, **34** or **44** to pivotally move the seat **20**, backrest **30** or leg portion **40** to the preset angle. The angle of the seat **20**, backrest **30** or leg portion **40** can be detected, for example, by a limit switch or encoder.

With reference to FIG. **1** and the "home position" in FIG. **7**, the initial angle can be such that the seat **20** is substantially horizontal with respect to the floor, with the backrest **30** and leg portion **40** positioned approximately perpendicular to the seat **20**. The memory of the control means **50** has stored therein the initial angle in advance. The initial angle is an angle enabling the user to sit in the seat easily or to stand up therefrom easily. For example, the seat **20** or the like can be returned to the initial angle by a touch of the initial position button **64**.

With reference to FIG. **7**, "position **1** (POS**1**)," the preset reclining angle can be, for example, such that the seat **20** makes with the floor **90** an angle Z of 20 to 40 degrees, preferably about 30 degrees, makes with the backrest **30** an angle L of 100 to 120 degrees, preferably about 110 degrees, and makes with the leg portion **40** an angle K of 100 to 120 degrees, preferably about 110 degrees (see FIG. **2**). With reference to FIG. **7** showing these angles Z, L and K, the angle Z causes the seat **20** to be positioned at a higher level above the floor toward its front end, the angle L is an angle the seat **20** makes with the backrest **30** on their upper surfaces, and the angle K is an angle the seat **20** makes with the leg portion **40** on their lower surfaces. In position **1**, the user as seated feels least burdened on the muscles, feeling relaxed and at ease throughout his or her whole body. The muscles are relaxed on the front and rear sides of the body, and the massage means **28**, **38**, **48** are operated in this state, whereby the user can be massaged effectively. The seat **20** and other portions are moved to position **1** at the touch of the reclining selection button **61** (POS**1**).

With reference to FIG. **7**, "position **2** (POS**2**)," a different example of reclining angle can be such that the seat **20** makes with the floor **90** an angle Z of 20 to 40 degrees, preferably about 30 degrees, makes with the backrest **30** an angle L of 110 to 130 degrees, preferably about 120 degrees, and makes with the leg portion **40** an angle K of 130 to 160 degrees, preferably about 140 degrees (see FIGS. **3** and **4**).

As shown in FIG. **8**, position **2** makes it possible to give a massage to the user in a more gentle posture than position **1**. The feet are at a higher level in position **2** than in position **1**, so that the massage means **28**, **38**, **48**, when operated in this state, give an effective massage especially to the legs to relieve the legs of fatigue. The seat **20** and the other portions can be moved to position **2** at the touch of the reclining selection button **62** (POS**2**).

The feet can be positioned at a higher level in position **2** and thereby brought to a higher level than the heart to position the knees at a lower level than the heart and thereby ensure an improved blood flow through the legs.

Since the legs of the user are raised to a higher level in position **2** than in position **1**, it is desirable to move the leg portion to this position from the initial position by way of position **1** instead of moving the leg portion directly from the initial position so as to lessen the burden on the user.

The legs of the user can be effectively massaged by giving a massage by the massage means **48** on the leg portion **40** after pivotally moving the seat **20**, etc. to position **2**, utilizing the advantage that the posture of the user in position **2** is favorable for the effective blood flow through the legs. In this case, it is desirable to provide, for example, a leg-up button (leg-raising body lower half button) **65** on the manual controller **60** for operating the massage means **48** as shown in FIG. **6**, and to make the button **65** pushable only when the massage machine

10 is in position 2. Alternatively, the machine may be made automatically movable to position at the touch of the button 65.

Massaging the legs concentrically with the legs held at a higher level not only improves the blood stream through the legs but also results in the advantage of improving the blood flow through the whole body.

Further as indicated by "full-flat" in FIG. 7, another example of preset different reclining angle is an angle positioning the backrest 30 and the leg portion 40 substantially horizontally with respect to the floor 90 and positioning the seat 20, backrest 30 and leg portion 40 substantially flat. The seat 20, etc. can be moved to a full-flat position at the touch of the reclining button 63 (full-flat). The full-flat position provides a flat chair like a bed, enabling the user to lie down so as to be given a massage in a relaxed state.

Although the machine is movable into position 1, position 2 or full-flat position by pushing the corresponding reclining selection button 61, 62 or 63, it is alternatively possible to effect a change-over between position 1, position 2 and full-flat position every time a single reclining selection button is pushed. When the reclining selection button is pushed within a predetermined period of time, e.g., within 2 seconds, after the depression of the button in this case, the touch of the button is accepted for a change-over without permitting any movement for the period of 2 seconds.

When the seat 20, backrest 30 and leg portion 40 are to be returned to the initial angle after having been pivotally moved to position 1, position 2 or the other position, the moving means 24, 34, 44 may be operated regardless of the angle of pivotal movement of the seat 20, backrest 30 and leg portion 40. The user will then be brought to an unnatural posture to feel discomfort.

It is therefore desirable to detect the position relationship between the seat 20 and the leg portion 40 and to make such adjustment as not to permit the leg portion 40 to return to the initial angle prior to the seat 20. For example, it is desirable to return the leg portion 40 to its initial angle after causing the seat 20 to restore its initial angle.

If the leg portion 40 is at the initial angle with the seat 20 or nearly at this angle therewith, it may be useful to pivotally move the leg portion 40 temporarily in a direction opposite to the correct direction of movement (namely. to raise the leg portion 40) and to thereafter pivotally move the leg portion 40 toward the initial angle while pivotally moving the seat 20 toward the initial angle.

Further alternatively, the timing for the leg portion 40 to restore its initial angle may be altered based on the angle Z the seat 20 makes with the floor 90 and the angle K the leg portion 40 makes with the seat 20 as shown in FIG. 9.

Stated more specifically, a touch of the initial position button 64 operates the moving means 24, 34, 44 for the seat 20, backrest 30 and leg portion 40, causing these portions 20, 30, 40 to restore their initial angles.

As shown in the flow chart of FIG. 10, the moving means 24, 34 of the seat 20 and the backrest 30 come to a stop at this time after operating to cause the seat 20 and the backrest 30 to restore their initial angles (steps 10 to 13 and steps 14 to 17).

For the leg portion 40, on the other hand, the moving means 44 is operated based on the level of the leg portion 40, the angle the portion 40 makes with the seat 20 and the angle between the floor 90 and the seat 20 as illustrated in the flow chart of FIG. 10.

With reference to the flow chart of FIG. 10, the control means 50 first calculates the level H of the outer end of the leg portion 40 from the floor 90 (see FIG. 9) based on the angle Z of the seat 20 and the angle K of the leg portion 40 (step 1). If the calculated level H is smaller than, for example, 10 cm (step 2), some article is unlikely to become caught between the leg portion 40 and the floor 90, so that the moving means 44 is operated so as to lower the leg portion 40 as it is (step 6). When the initial angle is reached (step 7), the moving means 44 is halted (step 8) to complete the movement (step 9).

On the other hand, if the level H of the leg portion 40 is not smaller than 10 cm (step 2) and when the angle K of the leg portion 40 (see FIG. 9) is, for example, up to 120 degrees (step 3), that is, when the angle between the leg portion 40 and the seat 20 is small, the moving means 44 of the leg portion 40 is operated once in a direction opposite to the direction toward the initial angle to pivotally move the leg portion so as to increase the angle K between the leg portion 40 and the seat 20 (step 4).

In the case where the angle K of the leg portion 40 is found to be greater than 120 degrees in step 3, or after the angle K between the leg portion 40 and the seat 20 has been increased by operating the moving means 44 in step 4, the difference between the angle K and the angle Z is calculated, and the operation of the moving means 44 is continued until the difference exceeds, for example, 120 degrees (step 5).

Upon the difference between the angle K and the angle Z exceeding 120 degrees Z (step 5), the moving means 44 is operated so as to lower than leg portion 40 (step 6). When the initial angle is reached (step 7), the moving means 44 is halted (step 8) to complete the operation (step 9).

As described with reference to the flow chart, the timing for the leg portion 40 to restore the initial angle is altered, for example, base on the angle of pivotal movement of the leg portion 40 with respect to the floor. This obviates the likelihood that the leg portion 40 as positioned at a high level will restore the initial angle earlier than the seat 20, consequently precluding an article from becoming caught between the leg portion 40 and the floor 90.

The embodiment described above is adapted to alter the timing for the leg portion 40 to restore its initial angle, based on the angle K the leg portion 40 makes with the seat 20 and the level H of the outer end of the leg portion 40, whereas the restoration timing may be altered base on one of these two values.

In the case where the backrest 30 is reclined by the reclining selection buttons 61 to 63, it is desirable that the speed of pivotal movement of the backrest 30 be smaller in the reclining direction than in the raising direction.

If the speed of the backrest 30 is greater in the reclining direction, the user who falls down rearward will be frightened. It is therefore desired that the speed of the backrest 30 be smaller in the reclining direction. However, when the backrest 30 is pivotally moved toward the raising direction, the user will be raised while facing toward the front and will therefore feel no fear. If the user wishes to stand up quickly from the backrest 30 as reclined and when the speed of the backrest 30 is small in the raising direction, the user will feel irritated or annoyed.

Accordingly, the backrest 30 is so controlled as to be reclined at a lower speed than when it is raised. The raising and reclining speeds of the backrest 30 are adjustable by varying the rotational speed of the motor of the moving means 34 for the backrest 30.

By making the reclining speed of the backrest 30 smaller than the speed of rise of the seat 20 (movement toward the horizontal direction), it is possible to prevent the backrest 30 from coming into contact with the floor or the limit switch from chattering, for example, when the backrest 30 is reclined (for example, to the full-flat position) while raising the seat 20 from the most reclined state.

This will be described in detail. If the backrest **30** is reclined at a high speed, for example, from position **1** or position **2** in FIG. **7** to the full-flat position, the backrest **30** will reach the floor before the seat **20** is brought to an approximately horizontal position. Accordingly, the limit switch is actuated to discontinue the reclining movement of the backrest **30** before this portion **30** reaches the floor. The seat **20** continues pivotally moving toward the rising direction while the backrest **30** is held at rest from the reclining movement. With this movement of the seat **20**, the backrest **30** rises again to release the limit switch. The release of the limit switch causes the moving means **34** to drive the backrest **30** toward the reclining direction again, permitting the chattering of the limit switch again for repeated chattering. However, such an incidence is avoidable by giving a lower reclining speed to the backrest **30**. The backrest **30** can be prevented from reaching the floor in the absence of the limit switch.

Further if the backrest **30** is given a high moving speed for reclining, the user is likely to become frightened, whereas the user can realize the reclining movement of the backrest **30** in advance in the case where the backrest **30** is reclined by the manual procedure of pushing the reclining button **68**. When the manual procedure is used, therefore, the backrest **30** may be reclined rearward at a higher speed than the movement, for example, to position **1** or position **2**.

The embodiment shown in FIGS. **1** to **4** is so adapted that the backrest **30** is pivotally movable with the seat **20** when the seat **20** is pivotally moved. When the moving means **24** of the seat **20** and the moving means **34** of the backrest **30** are operated at the same time in this case, the speed of the backrest **30** relative to the floor is "the speed of the seat relative to the floor"+"the speed of the backrest relative to the floor," hence an increased speed that will frighten the user when the backrest **30** is reclined. The user will further feel discomfort when the backrest **30** rises. Accordingly, to calm the fear to be felt by the user when the backrest **30** falls down, it appears desirable to follow the procedure to be described below when the seat **20** and the backrest **30** are to be pivotally moved to position **1**, position **2** or full-flat position, or when the seat **20** and the backrest **30** are to be pivotally moved to the position of initial angle (home position). Thus, instead of operating the moving means **24**, **34** for the seat **20** and backrest **30** at the same time, it is desirable to operate the moving means **24** of the seat **20** first to move the seat **20** to the desired angle and to subsequently operate the moving means **34** of the backrest **30** to move the backrest **30** to the desired angle as shown in FIG. **11**. Conversely, it may be advisable to operate the moving means **34** of the backrest **30** first to move the backrest **30** to the desired angle and to subsequently operate the moving means **24** of the seat **20** to move the seat **20** to the desired angle as shown in FIG. **12**.

Thus, the user is unlikely to become frightened or uncomfortable, with his or her body prevented from reclining rearward or inclining forward rapidly in its entirety.

With the moving means **24**, **34** prevented from being operated at the same time in this way, another advantage is available in that the momentary power consumption by the moving means **24**, **34** can be diminished.

While the moving means **24**, **34** or **44** is held in operation by pushing one of the reclining selection buttons **61**, **62**, **63** for movement to position **1**, position **2** and full-flat position and the initial position button **64** for movement to the home position, it is likely that one of these buttons **61**, **62**, **63**, **64**, the other reclining-related button (e.g., manual reclining button **68**) and manual buttons will be manipulated. It is then desirable to halt the operation of the moving means **24**, **34**, **44** of the seat **20**, backrest **30** and leg portion **40**. Thus, enhanced safety can be assured by bringing the moving means **24**, **34**, **44** out of operation when one of the buttons is pushed while the moving means **24**, **34**, **44** is in operation.

Furthermore, it is desirable that a sensor **58** (see FIG. **5**) electrically connected to the control means **50** for detecting the presence or absence of the person to be massaged be provided for the backrest **30** and/or the seat **20**, so as to check the massage machine **10** for the presence or absence of the person thereon. When no person is detected for a massage, it is desirable that the moving means **24**, **34**, **44** be so controlled as to be held out of operation even if any one of the reclining selection buttons **61**, **62**, **63**, initial position button **64**, etc. is manipulated.

The sensor **58** to be used is, for example, a pressure sensor or a switch comprising an electrode.

Operation errors can be prevented to ensure enhanced safety by limiting the operation of the moving means **24**, **34**, **44** depending on whether the person to be treated is present or not.

When the initial position button **64** for moving the seat **20**, backrest **30** and leg portion **40** to the home position is pushed while the user is being treated by the massage means **28**, **38**, **48**, it is desirable to halt the operation of the massage means **28**, **38**, **48** and to thereafter operate the moving means **24**, **34**, **44** by the control operation of the control means **50**.

The user pushes the initial position button **64** usually when desiring to terminate the massage operation. Accordingly, the massage operation can be terminated without discomfort by bringing the massage means **28**, **38**, **48** out of operation before the seat **20**, backrest **30** and leg portion **40** are moved to the home position. This enables the user to stand up smoothly upon the seat **20**, etc. reaching the home position.

FIG. **6** shows an operation on/off switch **67**. The manual controller is so adapted that when this switch is off, the manual buttons such as the reclining selection buttons **61** to **63** and manual reclining button **68** are held inoperative, except for the initial position button **64** which alone is operative for the return of the movable components to the home position. This assures convenience.

While the manual controller **60** has many buttons **61** to **68**, etc. as shown in FIG. **6**, the controller is preferably provided with an auxiliary controller **70** of different size as shown in FIG. **13**. The auxiliary controller **70** is electrically connected to the control means **50** and, for example, can be provided with only a manual button **71** for moving the seat **20**, backrest **30** and leg portion **40** to position **1** which is frequently used, massage start button **72**, stop button **73** and initial position button **74** for restoring the seat **20**, backrest **30** and leg portion **40** to the initial angle (home position).

The auxiliary controller **70** of small size for a minimized number of manipulations enables the user to select a desired manipulation by groping during a massage operation without causing any trouble to the massage operation.

## INDUSTRIAL APPLICABILITY

The invention provides a massage machine of the chair type comprising a seat, backrest and leg portion having a plurality of preset reclining angles for giving an effective massage to the user.

What is claimed is:

**1**. A chair-type massage machine comprising:

(a) a base to be placed on a floor,

(b) a seat pivotally movably supported by the base for a user to be seated in,

(c) a backrest pivotally movably supported by the seat at a rear end thereof for the user's back to bear on,

(d) a leg portion pivotally movably supported by the seat at a front end thereof for the user's calves to bear on,

(e) seat moving means for pivotally moving the seat,

(f) backrest moving means for pivotally moving the backrest,

(g) leg portion moving means for pivotally moving the leg portion,

(h) a manual controller controllable by the user,

(i) reclining selection buttons provided on the manual controller, and

(j) control means electrically connected to the manual controller and structured to control the seat moving means, the backrest moving means and the leg portion moving means,

said control means being preprogrammed to take a plurality of sets of preset reclining angles Z, L and K with respect to the angle of the seat, the backrest and the leg portion, respectively, wherein said reclining angle Z is an angle to bring the seat to 20 to 40 degrees with the floor, said reclining angle L is an angle to bring the backrest to 100 to 120 degrees with the seat and said reclining angle K is an angle to bring the leg portion to 100 to 120 degrees with the seat, and

said control means being controllable to manipulate the seat moving means, the backrest moving means and the leg portion moving means to thereby move the seat, the backrest and the leg portion to a selected set of reclining angles, when one of the reclining selection buttons corresponding to a desired one set of the preset reclining angles is selected by the user.

**2**. The chair-type massage machine according to claim **1** wherein said control means is further preprogrammed to take another set of said preset reclining angles Z, L and K, wherein said reclining angle Z is an angle to bring the seat to 20 to 40 degrees with the floor, said reclining angle L is an angle to bring the backrest 110 to 130 degrees with the seat, and said reclining angle K is an angle to bring the leg portion to 130 to 160 degrees with the seat.

**3**. The chair-type massage machine according to claim **2** wherein the seat, the backrest and the leg portion are pivotally movable to the angle Z, the different angle L, and the different angle K, respectively, from a state wherein the seat makes the angle Z of 20 to 40 degrees with the floor, makes the angle L of 100 to 120 degrees with the backrest, and makes the angle K of 100 to 120 degrees with the leg portion.

**4**. The chair-type massage machine according to claim **1** wherein said control means is further preprogrammed to take another set of said preset reclining angles positioning the backrest and the leg portion substantially horizontally with respect to the floor and positioning the seat, the backrest and the leg portion substantially flat.

**5**. The chair-type massage machine according to claim **1** wherein the seat moving means, the backrest moving means and the leg portion moving means are provided with respective independent drive means each controllable by the control means, the manual controller being provided with an initial position button for restoring the seat, the backrest and the leg portion to respective preset initial angles, and the control means alters the timing for the leg portion to restore the initial angle thereof based on the angle of pivotal movement of the seat and the angle of pivotal movement of the leg portion when the initial position button is manipulated to restore the seat, the backrest and the leg portion to the respective preset initial angles from an inclined state.

**6**. The chair-type massage machine according to claim **5** wherein after the seat has been restored to the initial angle thereof, the control means controls the drive means of the leg portion so as to restore the leg portion to the initial angle thereof.

**7**. The chair-type massage machine according to claim **5** wherein when the angle of pivotal movement of the leg portion relative to the initial angle thereof is a least a predetermined value smaller than the angle of pivotal movement of the seat relative to the initial angle thereof, the control means operates the drive means of the leg portion moving means to pivotally move the leg portion once in a direction opposite to the direction toward the initial angle thereof, thereby increasing the angle K, and thereafter pivotally moves the leg portion to the initial angle thereof.

**8**. The chair-type massage machine according to claim **5** wherein the control means alters the timing for the leg portion to restore the initial angle thereof based on the level of an outer end of the leg portion from the floor.

**9**. The chair-type massage machine according to claim **1** wherein the seat moving means, the backrest moving means and the leg portion moving means are provided with respective independent drive means each controllable by the control means, and the control means controls the drive means of the backrest moving means so that the speed of pivotally moving the backrest is smaller in a reclining direction than in raising direction.

**10**. The chair-type massage machine according to claim **1** wherein the seat moving means, the backrest moving means and the leg portion moving means are provided with respective independent drive means each controllable by the control means, and the control means prevents the seat moving means and the backrest moving means from operating at the same time when one of the reclining angles is selectively manipulated by one of the reclining selection buttons of the manual controller.

**11**. A chair-type massage machine comprising:

(a) a base to be placed on a floor,

(b) a seat pivotally movably supported by the base for a user to be seated in,

(c) a backrest pivotally movably supported by the seat at a rear end thereof for the user's back to bear on,

(d) a leg portion pivotally movably supported by the seat at a front end thereof for the user's calves to bear on,

(e) seat moving means for pivotally moving the seat,

(f) backrest moving means for pivotally moving the backrest,

(g) leg portion moving means for pivotally moving the leg portion,

(h) a manual controller controllable by the user,

(i) reclining selection buttons provided on the manual controller, and

(j) control means electrically connected to the manual controller and structured to control the seat moving means, the backrest moving means and the leg portion moving means,

said control means being preprogrammed to take a plurality of sets of preset reclining angles Z, L and K with respect to the angle of the seat, the backrest and the leg portion, respectively, wherein said reclining angle Z is an angle to bring the seat to 20 to 40 degrees with the floor, said reclining angle L is an angle to bring the backrest to 100 to 120 degrees with the seat and said reclining angle K is an angle to bring the leg portion to 100 to 120 degrees with the seat, and

said control means being controllable to manipulate the seat moving means, the backrest moving means and the leg portion moving means to thereby move the seat, the backrest and the leg portion to a selected set of reclining

angles, when one of the reclining selection buttons corresponding to a desired one set of the preset reclining angles is selected by the user,

wherein the seat moving means, the backrest moving means and the leg portion moving means are provided with respective independent drive means each controllable by the control means, the manual controller being provided with an initial position button for restoring the seat, the backrest and the leg portion to respective preset initial angles, and the control means alters the timing for the leg portion to restore the initial angle thereof based on the angle of pivotal movement of the seat and the angle of pivotal movement of the leg portion when the initial position button is manipulated to restore the seat, the backrest and the leg portion to the respective preset initial angles from an inclined state, and

wherein when the angle of pivotal movement of the leg portion relative to the initial angle thereof is a least a predetermined value smaller than the angle of pivotal movement of the seat relative to the initial angle thereof, the control means operates the drive means of the leg portion moving means to pivotally move the leg portion once in a direction opposite to the direction toward the initial angle thereof, thereby increasing the angle K, and thereafter pivotally moves the leg portion to the initial angle thereof.

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